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ABSTRACT

Examined are the effects of test-taking training given to Hispanic students on the reliability and predictive validity of a mathematics predictor test. The sample consisted of 535 entering Hispanic college students. Of these, 241 completed most of their education in the United States and had prior familiarity with multiple-choice tests, while 294 students had received most of their education outside of the United States and were unfamiliar with the multiple-choice test format. The students were randomly assigned to the experimental or control group. Students in the experimental group were instructed on those skills outlined by Millman, Bishop and Ebel which are independent of the test constructor. Control subjects received information on the college's mathematics programs for an equivalent period of time. All subjects were administered the computation scale of the College Guidance and Placement Program (CGP). Based on the results of the predictor test, subjects were placed in either a Basic Skills or Algebra course. A total of 159 subjects completed the courses. Results showed slightly lower internal consistency estimates for the experimental group and an increase in predictive validity for experimental subjects. (Author/PN)

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Effect of Pretraining Hispanic Students on Test-taking Strategies on the Reliability and Predictive Validity of a Mathematics Predictor Test

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ABSTRACT

The purpose of this study was to examine the effects of a test-taking training given to Hispanic students on the reliability and predictive validity of a mathematics predictor test. The sample consisted of 535 entering Hispanic college students. Of these, 241 completed most of their education in the United States and had prior familiarity with multiple-choice tests, while 294 students had received most of their education outside of the United States and were unfamiliar with the multiple-choice test format. The students were randomly assigned to the experimental or control group. Students in the experimental group were instructed on those skills outlined by Millman, Bishop and Ebel (1965) which are independent of the test constructor. Control subjects received information on the college's mathematics programs for an equivalent period of time. All subjects were administered the computation scale of the College Guidance and Placement Program (CGP). Based on the results of the predictor test, subjects were placed in either a Basic Skills or Algebra course. A total of 159 subjects completed the courses. Results showed slightly lower internal consistency estimates for the experimental group and an increase in predictive validity for experimental subjects. The increase was significant for the total group in the Basic Skills course ($p < .05$) and the Algebra course ($P < .01$). When the groups were divided on the basis of

where the students had received most of their education (United States vs. outside the United States), the difference in validity coefficients was significant for the group of students educated in the United States in the Basic Skills course only.

INTRODUCTION

The adequate use of standardized tests as a mean of assessment for Hispanic students has been highly questioned. Traditional instruments fail to recognize the lack of familiarity of many Hispanic students with test format, particularly those who have been educated outside the United States. Many Hispanic students do not appear to have the test-taking skills necessary to be properly evaluated.

An increasing interest in test-taking skills or testwiseness is evident in numerous recent studies on test characteristics that relate to it (Kuntz, 1982), and also in publications designed to instruct students in this skill (Dobbin, 1981; Hills, 1981). Studies have focused primarily on the extent to which certain instruments are susceptible to testwise influences and the extent to which these skills can be taught. Most studies have compared mean performance of trained versus untrained groups and have reported significant results (Dreisbach and Keosh, 1982; Frierson, 1977; Gaines and Jongsma, 1974).

Smith (1982) has proposed a cognitive model of test-taking strategies. According to his model, testwiseness is invoked when an examinee is unable to respond to an item because of lack of knowledge. In this situation, getting an item correct, although the examinee lacks knowledge, would seem to decrease the validity of the measure. A second test-taking situation should be considered in any specification of testwiseness. That is, an examinee

may get an item incorrect because he or she lacks familiarity with item/test format, although knowledge of the item may be present. In this case then, getting the item correct would increase validity. There is empirical evidence to suggest that certain student subpopulations lack familiarity with standard testing procedures and profit from training in these skills (Arroyo, 1981). These two situations are implied in the classification of testwiseness proposed by Millman et al., (1965). It is the second situation which is the focus of the present study.

The purpose of this study was to investigate the extent to which the test-taking instruction of Hispanic college students affects the psychometric properties of a test. More specifically, it sought to discover the effects of test-taking training on Hispanic college students who had received most of their education either in or outside of the United States relative to the reliability and predictive validity of a mathematics predictor test.

METHOD

Sample

The sample consisted of 535 Hispanic entering college students from Miami-Dade Community College, New World Center, who took the required basic skills assessment. Of these students 43% were male, and 57% were female. Subjects were randomly assigned to either a control or an experimental group within each of the testing sessions available at the college. Groups consisted of an average of 35 students.

Procedures

Groups were taken into separate rooms for testing. Initially, both groups were given a background information form to be completed and a letter of informed consent. The experimental group met for thirty minutes prior to the administration of the College Guidance Placement Battery (CGP). During this time, students were trained in test-taking skills using the outline of testwiseness principles proposed by Millman et al., (1965). The first component of the outline which deals with elements independent of test constructor or test purpose was used.

Each student in the experimental group received a booklet containing instructions on test-taking strategies. The experimenter read and explained the instructions. Brief examples were discussed. At the end of instruction, a short practice test in test-taking principles was given to the students. The practice test consisted of ten questions similar in format (multiple-choice) to the questions in the predictor test (CGP). After the students solved the problems, the experimenter explained the correct approach. Questions were answered. The control group participated in a thirty-minute orientation session. They were informed about the different educational programs that the college offers. After the thirty-minute pretraining or orientation sessions, the college testing department administered the CGP.

Students were placed in the mathematics courses according to the scores obtained in the computation scale of the CGP. Those students who obtained a score of 21 or higher were placed in Introductory Algebra, students who obtained a score below 21,

were placed in Basic Skills. If a student wished to take a more advanced course, the student had to take another test. Some students took this option.

Introductory Algebra and Basic Skill classes were taught by instructors assigned by the chairperson of the Natural Science Department. Students selected their class schedules so control and experimental groups were no longer separated. All classes used the same textbook and all instructors followed the same competency statements.

Instruments

The predictor test used in this study, the College Guidance and Placement Program (CGP), Computation, takes twenty minutes and consists of 35 four-choice questions. It is concerned primarily with basic arithmetic operations on whole numbers, fractions, decimals, and percents. A satisfactory score on the test could indicate a student's readiness to enter any course whose only mathematics prerequisite is computational skills. A low score might point out a need for developmental work in basic arithmetic.

To establish predictive validity, the criterion used was final exam grade. The criterion tests were a common effort of the instructors teaching the courses in Basic Skills or Introductory Algebra. These two exams were comprehensive and used a short-answer item format. Students were given sufficient time to finish. Internal consistency estimates using KR21 for the Basic Skills Exam was .62, while that for the Introductory

Algebra Exam was .66. Since KR21 assumes equal difficulty of items and that could not be verified for this study, these estimates are likely to be underestimates.

Analysis

KR20 reliability estimates were computed for the CGP for the experimental and control groups separately. Additionally, coefficients were computed for subjects educated outside of the United States separately from subjects educated in the United States. To determine predictive validity, correlation coefficients were obtained between CGP scores and the scores obtained in the comprehensive final exam for each of the groups. This portion of the analysis was based on smaller samples due to attrition in the Algebra and Basic Skills classes. Fisher's r to z transformations were used to test the significance of the difference between the validity coefficients of the experimental and control groups.

Results

Means and standard deviations are reported in Table 1.

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Insert Table 1 about here

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Overall, experimental subjects scored higher than control subjects. This difference was significant for the Hispanic students who had received much of their education in countries other than

the United States. The result is in agreement with previous studies involving other Hispanic populations (Dreisbach and Keosh, 1982; Bernal, 1977; Frierson, 1977; Gaines and Jongsman, 1974). For Hispanic students educated in the United States, control subjects showed a higher mean, although this difference was non-significant.

Table 2 shows the reliability coefficient of the predictor test (CGP) for each of the groups. These results show that the training affected the reliability coefficient of the predictor test only slightly.

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Insert Table 2 about here

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Table 3 shows the number of students in the groups who completed the Basic Skills and Algebra courses. The rate of attrition for subjects in this study was not unlike that commonly observed in these courses, and did not differ significantly between experimental and control groups.

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Insert Table 3 about here

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Also shown in Table 3 are the correlations between the CGP and the final exam for each course separately. These correlations were computed by group.

Correlations between CGP test scores and final grade were higher in the experimental groups. This difference was significant for the total group in the Basic Skills course ($p < .05$) and the Algebra course ($p < .01$). When the groups were divided on the basis of where the students had received most of their education (United States vs. outside the United States), the difference in validity coefficients was significant for the group of students educated in the United States in the Basic Skills course only. The small sample sizes involved in subgroup comparisons are likely to be responsible for the lack of significance.

CONCLUSIONS

Several studies have suggested that Hispanic students lack the necessary test-taking skills for adequate evaluation with standardized tests (Arroyo, 1982; Ginther, 1978). It has also been shown that training Hispanic students on test-taking skills has helped these students improve their test scores. A study by Ginther (1978), indicated that training Hispanic students on parallel-test items increased the reliability and predictive validity of specific instruments. Although in her study students were not specifically trained in test-taking principles, it seemed to indicate that a specific psychometric property of the instrument had been modified by the treatment. The findings of the present study were in agreement with those of Ginther (1978).

Although reliability was basically unaffected, the

predictive validity of the instrument increased for Hispanic students in the experimental group.

The results of the study indicate that Hispanic students can profit from a short training in these skills. They also indicate that the psychometric properties of the instruments used to evaluate Hispanic students may be improved by training provided to the students. These results are important to anyone involved with the education, placement, and admission to programs, colleges, and universities of Hispanic students. Further replications are recommended, since the sample sizes involved in the computation of validity coefficients were small. However, the consistency of results between the two courses investigated here would seem to indicate that these findings are replicable in similar populations.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF CGP
BY GROUP

	Control		Experimental	
	Mean Score	Standard Deviation	Mean Score	Standard Deviation
Group 1	20.325	6.269	18.386	5.750
Group 2	17.948	6.857	21.324	6.595
Total	19.010	6.803	20.013	6.430

Group 1 Hispanic students educated in the United States

Group 2 Hispanic students educated outside the United States

TABLE 2

CGP RELIABILITY COEFFICIENTS (KR20)
BY GROUP

	Control		Experimental	
	Number of Students	Reliability Coefficient	Number of Students	Reliability Coefficient
Group 1	114	.866	127	.875
Group 2	124	.890	170	.865
Total	238	.889	297	.855

Group 1 Hispanic students educated in the United States

Group 2 Hispanic students educated outside the United States

TABLE 3

CORRELATIONS BETWEEN SCORES ON PREDICTOR TEST AND SCORES ON FINAL EXAM

	Basic Skills				Introductory Algebra			
	N	Control	N	Experimental	N	Control	N	Experimental
Group 1	15	.281	22	.740*	22	.355	16	.615
Group 2	26	.476	22	.603	20	.112	16	.492
Total	41	.390	44	.671*	42	.131	32	.663**

Group 1 Hispanic students educated in the United States

Group 2 Hispanic students educated outside the United States

* $p < .05$
** $p < .01$

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